fuel bed impinge upon the arch where the direction of flow changes to horizontal. These gases when they reach the end of the arch will have a certain velocity of flow which will carry them beyond the end of the arch, possibly a portion of them into the first bank of tubes, before they start rising again. The upper portion of the first and second pass acts as an inverted pocket into which the hottest gases flow, the section under the front drum being much hotter than that under the second drum. The tube banks act as refrigerating surface for the gases and heating surface for the water.

The current of hot gases in front of the first bank of tubes is at least 700° C. hotter than the tubes. Their ascensional velocity, due to temperature, is sufficient to carry them the height of the setting in a very small fraction of a second. A part of the gases will be chilled below the ignition temperature and below the temperature which would permit them to float over the top of the first baffle. These gases will circulate down in the spaces between the tubes, depositing soot on them, until they reach the back of the firebox, where they absorb heat and tend to rise again.

The gases in the top portion of the second pass will have a temperature in excess of 600° C. which is about 350° C. hotter than the second bank of tubes, a temperature sufficiently low to permit 75 per cent of the CO present to be dissociate into CC>2 with an accompanying deposit of soot. The refrigerating surface of the second bank of tubes will chill these gases still further so that they will tend to drop into the lower part of the setting where a portion of them will pass under the second baffle. This portion of the gases will be hot enough to float up to the top of the third pass after mixing with some of the chilled gases that have flowed down the third bank of tubes. Some of the gas will

be carried downward by the cooling action of the third bank of tubes but the temperature difference between the water-cooled refrigerating surface and the gases is not very great at this point, and the hottest portion of these gases will tend to rise further into the smoke flue.

A number of attempts have been made to distribute the draft loss between the ash pit and the stack damper, on a percentage basis, between the different passes. All of these are apparently based upon the static pressure. In the boiler shown in Fig. 168 there are three vertical columns of gases. These columns exert